



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 10 HANFORD PROJECT OFFICE

712 Swift Boulevard, Suite 5  
Richland, Washington 99352

0058156

October 9, 2002

Mark French  
Spent Nuclear Fuel Project  
U.S. Department of Energy  
P.O. Box 550 Mailstop A4-79  
Richland, WA 99352

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EDMC

Subject: Notice of Construction Approvals from the Department of Health

Dear Mr. French:

Enclosed are three Notice of Construction Approvals from the Department of Health that apply to Spent Nuclear Fuel Removal from the 105-KW and 105-KE fuel storage basins. These documents are transmitted to the Department of Energy for your use in conduct of these activities. If you have any questions, you may contact me at 509-376-9884.

Sincerely,

*Laurence E. Gadbois*

Laurence E. Gadbois  
K Basins Project Manager

Cc Dave Watson, Fluor  
Administrative Record, 100-KR-2

Enclosures:

- 1) NOC Application/Permit Revision, Approved by EPA September 12, 2002
- 2) NOC Approval for 105-KW Basin Fuel Removal, printed on October 4, 2002
- 3) NOC Approval for 105-KE Basin Fuel Removal, printed on October 4, 2002

**NOC Application/Permit Revision**

NOTE: Any increase to abated or unabated PTE requires a full NOC modification

NOC  
231**REASON FOR CHANGE**

Submittal Date: \_\_\_\_\_

Submittal Type: RTAM Submittal☒ **NOC Application Revision**New NOC Rev Number: DOE/RL-97-28  
2C☐ **Condition Change/ Clarification**

WDOH Condition Number: \_\_\_\_\_

AOP Condition Number: \_\_\_\_\_

☐ **ALARACT Revision**

New ALARACT Rev Number: \_\_\_\_\_

**PROJECT IDENTIFICATION**Project Title: 105KW Basin Fuel Removal (CERCLA Cleanup)Current NOC Application Number: DOE/RL-97-28, Rev. 2AEI ID Number (AOP Emission Unit Number(s)): 100K P-105KW-001 thru 004

Current WDOH Approval Letter Number(s): \_\_\_\_\_

WDOH NOC ID Number: 231**DESCRIPTION OF CHANGE**Number of Attachments 1*WDOH will provide a new approval letter containing any new or modified conditions that result from the following proposed change.*

Proposed Change (provide original and proposed wording):

See attached

**SIGNATURES**

Reviewed by Contractor	Reviewed by RL/ORP	Concurrence by WDOH
<i>[Signature]</i> 9-3-02	<i>[Signature]</i>	<i>[Signature]</i> 9-5-02
		Approved by EPA
		<i>[Signature]</i>
Date:	Date: <u>9-4-02</u>	Date: <u>Sept 12 2002</u>

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OCT 07 2002

DOE/RL-97-28 REV 2

1 The CTO will have one or more Nuc Fill filters for venting. These filters will be located  
2 in the CTO lid.

3 8.3 CONTROL EQUIPMENT EFFICIENCIES

4 The existing water treatment system contains ion exchange components for removal of  
5 radionuclides and particulate filters for removal of particulate radionuclides. Removal  
6 efficiencies are presented in Tables 8-1 and 8-2 for the existing system and new IWTS. The  
7 removal efficiencies for IXMs decrease with increasing run time. The IXMs are changed out  
8 when sampling indicates the removal efficiency for cesium-137 decreases from 99 percent to  
9 approximately 70 percent. Time between changeouts varies and depends on basin water quality;  
10 changeouts are expected to occur as frequently as every few weeks.

11  
12 Table 8-1. Projected Removal Efficiencies of the Existing  
105-KW Basin Water Treatment System.

Equipment	Nominal Flow Rate	Efficiency at Stated Particulate Size	Remarks
Sandfilter (existing)	400 gpm	95%	Particulate removed at 10 microns or larger
IXMs	160 gpm	N/A <sup>1</sup>	No particulate removal anticipated
Cartridge Filter (existing on recirculation system)	450 gpm	95%	Disposal cartridge filters for particles 5 microns or larger in size (varying filter sizes are available)

17 Note:

18 Radionuclide removal efficiency of key dissolved isotopes is as follows:

19 Strontium 99%

20 Cesium 99%

21 Plutonium 81%

## DOE/RL-97-28 REV 2

Table 8-2. Projected Particulate Removal Efficiencies of new 105-KW Basin Water Treatment System Components.

Equipment	Nominal flow rate	Efficiency, at Stated Particulate Size	Remarks
Knock-out-pots	320 gpm	100%	Particulate removal at 550 microns and larger.
Settling Tanks	32 gpm (each)	95%	Particulate removal at 50 microns and larger
Filter vessels	107 gpm (each)	95%	Particulate removal at 5 microns or larger.
Polishing Unit	320 gpm	99%	Particulate removal at 2 micron or larger.
		88%	Particulate removal at 1 micron or larger
IXM's	160 gpm (each)	N/A	No particulate removal anticipated. TRU removal 93.9% and Cs-137/Sr-90 removal 99.8%

#### 8.4 INTEGRATED WATER TREATMENT SYSTEM OPERATIONAL CONTROLS

Rev. 2c

~~The minimum configuration of the existing water treatment system will be at least one IXM operating during underwater operations that disturb the fuel or sludge.~~

The minimum configuration of the IWTS will be at least one ion exchange and filtration component in operation before handling fuel. No operations that disturb the source term in the water will be conducted if the cesium-137 concentration in the basin water exceeds 30 micro curies per liter. Additionally, at a level of 15 microcuries per liter of cesium-137, incremental water treatment equipment will be placed on-line.

The other elements of the IWTS will be operated selectively depending on water quality process needs. Should the IWTS fail entirely during underwater fuel handling, the operations involving fuel already on the process table may be completed to allow for a safe and orderly shutdown.

#### 8.5 UNDERWATER WORK CONTROLS

Underwater work controls will be comprised of operating the existing basin water treatment system or the IWTS based on the nature of underwater work activity being conducted. These controls are described in Table 8-3.

DOE/RL-97-28 REV 2

Table 8-3. Underwater Work Controls.

Underwater Activity	Underwater Control Technology	
	Existing Basin Water Treatment System <sup>1</sup>	Integrated Water Treatment System <sup>1</sup>
Storage of SNF in closed canisters	X	
Storage and handling of cleaned SNF in MCO baskets or open canisters	X	
Retrieving closed canisters with SNF	X	
Decapping closed canisters with SNF		X
Washing SNF in primary clean machine		X
Cleaning sludge/particulates on the process table		X
Secondary cleaning		X
Sludge relocation <sup>2</sup>	X	X
Moving cleaned SNF on the process table, to MCO baskets, and MCO baskets to an MCO	X	

<sup>1</sup>In all cases, the basin water quality will be maintained to keep the Cs-137 concentration below the action levels described in the NOC (i.e., 15  $\mu\text{Ci/L}$  and 30  $\mu\text{Ci/L}$ ).

<sup>2</sup>Either the existing basin water treatment system or IWTS shall be operated during this activity.

MCO = multi-canister overpack.

NOC = Notice of Construction.

SNF = spent nuclear fuel.

*Replace with  
attachment table*

Table 2. Underwater Water Work Controls				Underwater Control Technology			
Activity	Sump System	Primary Recirculation System	Cartridge System	BMP	R	B	B
Storage and relocation of SNF in closed casks	Sand Filter	IXM	Chiller	BMP	R	B	B
Relocating sludge within basin pool	R	R	R	R	R	B	B
SNF in open unwashed casks, debris, and removal of SNF and debris from basin pool, cask, cleaning	R	R	R	R	R	B	B
Movement of SLG in and out of the basin	R	R	R	R	R	B	B
Returning closed casks with SNF	BMP	R	B	BMP	R	B	B
Decapping closed casks with SNF	BMP	R	B	BMP	R	B	B
Washing SNF in P.C.M.	R	R	R	R	R	B	B
Creating sludge/particles on the process table	R	R	R	R	R	B	B
Secondary cleaning	R	R	R	R	R	B	B
Storage of cleaned SNF in MCO baskets or open casks	BMP	R	R	BMP	R	B	B
Moving/handling cleaned SNF on the process table to casks or MCO baskets and MCO baskets to MCO	BMP	R	R	BMP	R	B	B
Movement of sludge from under water in 105K W Basin locations to transfer bay sludge transportation with cask and sludge containers	R	R	R	R	R	B	B

8.3

Table 2. Underwater Water Work Controls

Underwater Control Technology

Existing Water Treatment

Primary Recirculation System

Cartridge System

BMP

R

B

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Underwater Control Technology

Existing Water Treatment

Primary Recirculation System

Cartridge System

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Underwater Control Technology

Existing Water Treatment

Primary Recirculation System

Cartridge System

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DEPARTMENT OF HEALTH  
RADIOACTIVE AIR EMISSIONS  
NOTICE OF CONSTRUCTION  
APPROVAL FOR  
PROJECT TITLE: 105-KE BASIN FUEL REMOVAL

Date Approved: 06-Oct-01

Emission Unit Name: 105-KE VENTS

Emission Unit ID 190

This is a MINOR, ACTIVELY ventilated emission unit.

**This emission unit requires the following Abatement Technology:**

Applicable Requirements: ALARCT

ALARCT [WAC 246-247-040(4)]  
BARCT [WAC 246-247-040(3)]

Zone or Area:	Abatement Technology	Required # of Units	Additional Description/Conditions
	Sandfilter	1	
	Cartridge filter	2	2 in parallel (if required)
	Ion exchange	2	2 in parallel
	Recirc pump	2	2 in parallel
	Skimmer pump	1	1 in parallel (if required)
	Chiller	1	
	Water Basin	1	Configuration of equipment may change based on water action levels and basin activities.

Additional abatement technologies required by this Notice of Construction will be listed in the Conditions and Limitations section.**This emission unit has the following Monitoring and Sampling Requirements:**

Applicable Requirements: Monitoring, Testing and Quality Assurance WAC 246-247-075

Federal and State Regulatory	Monitoring and Testing Procedure	Radionuclides Requiring Measurement	Sampling Frequency
40 CFR 61.93[b][4][i] & WAC 246-247-075[3]	Appendix B, Method 114(3)	Gamma Scan	Monthly Sample

Sampling Requirements: Record Sample

Additional monitoring or sampling requirements established by this NOC will be listed in the Conditions and Limitations section.**Change History**

09/09/1993 Original approval given on September 9, 1993 via AIR 93-908.

10/14/1993 NOC revision approved on October 14, 1993 via AIR 93-923.

03/05/1997 NOC revision approved on March 5, 1997 via AIR 97-206.

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U. S. E P A

03/19/1997 Telecon March 19, 1997 provided an amendment to AIR 97-206 to allow above water work.

09/15/1998 NOC Revision approved in RTAM meeting minutes.

03/07/2000 NOC revision form approved March 7, 2000 provided a process description change.

03/07/2001 NOC Application/Permit Revision form approved March 7, 2001 via approval number AIR 01-504, changed/clarified conditions.

03/26/2001 A meeting to clarify previous condition/limitations was held March 26, 2001, AIR 01-504.

07/16/2001 NOC Revision (DOE/RL-96-101, Rev 1) received July 16, 2001.

10/04/2001 NOC Revision (DOE/RL-96-101, Rev 2) received October 4, 2001. This review incorporates all comments from Rev 1.

05/07/2002 May 7, 2002. NOC change to reflect changes in Fuel Annex design. NOC Revision 2, DOE/RL-96-101 approved in RTAM May 7, 2002. This is a CERCLA Facility. No approval letter needs to be generated. No additional conditions and limitations need to be added. This concurs with EPA on changes to the Fuel transfer Annex Design.

## CONDITIONS AND LIMITATIONS

- 1) The U.S. Department of Energy shall comply with all Conditions and Limitations of this license (WAC 246-247-060(5)).
- 2) The total abated emission limit for this Notice of Construction is limited to  $5.11\text{E-}04$  mrem/year to the Maximally Exposed Individual (WAC 246-247-040(5)). The total limit on the Potential-To-Emit for this Notice of Construction is limited to  $4.18\text{E-}03$  mrem/year to the Maximally Exposed Individual (WAC 246-247-030(21)).
- 3) **This process is limited to:**  
activities necessary to remove spent nuclear fuel from the 105 K East (KE) Basin and transport the fuel to the 105 K West (KW) Basin to be prepared to be transported to the Cold Vacuum Drying Facility (CVDF). Removal and transport of the fuel is limited to the four following program elements: supporting construction activities necessary to provide the specialized equipment to do the work, processing underwater fuel and treating associated water by the existing water treatment system, removing the fuel from the water and transporting the fuel the KW Basin, and handling of fuel retrieval byproducts including debris and sludge.

The fuel retrieval process is limited to being conducted underwater. The process will encompass placing up to 10 canisters into a Shielded Transfer Cask (STC) underwater. Underwater operations involve the use of hoists and lifting tools similar to those used in the past. Following this, the STC lid will be closed underwater. The STC will be removed out of the basin pool by way of an underwater lift system in the dummy elevator pit area. The STC will then be rolled into the cask transfer annex and be placed into a cask transfer overpack (CTO). This is done to minimize and isolating any surface contamination from the environment. The STC/CTO will then be transferred to the KW Basin where it will be unloaded. Once unloaded the STC/CTO will return to the KE Basin for the next loading. This will be repeated until all the canisters loaded with SNF are removed. Any residual sludge in the STC may be transferred by moving it to an under water sludge accumulation area. Underwater operations shall involve the use of manipulators to handle the fuel, although some (above water) hoists will be used to handle MCO baskets and canisters. The use of long-handled tongs or similar tools will supplement the manipulators as necessary. The radionuclides dispersed within the water during this process shall be collected and treated by the existing water treatment system.



Construction activities are limited to the installation of uncontaminated equipment in the basin, portions of equipment placed underwater on the floor of the basin and portions of equipment installed above water.

During the installation of fuel transfer system (FTS), the project is allowed to remove, reconfigure, reinstall, and test such equipment. Follow as low as reasonably achievable (ALARA) methods to control contamination.

The FTS operation shall retrieve the fuel from storage locations in the basin, load the fuel into STC and load the STC into a CTO. All FTS operations occur in the basin and the cask transfer annex.

The existing water treatment system shall maintain basin water quality during fuel retrieval and removal activities.

The existing water treatment system shall treat the basin water by filtration and ion exchange.

Water in the basin shall be managed as a closed-loop system, with the water continually being removed from the basin, the majority of which will be circulated through the treatment system and returned to the basin.

In the transfer bay area, excess treated basin water shall be removed. Water shall be removed via a connection located in the transfer bay. This water shall be pumped to a tanker truck and transported to the 200 Area Effluent Treatment Facility (200 Area ETF). The tanker truck shall be equivalent to the truck currently being used to transport water from the 100 N Emergency Dump Basin to the 200 Area ETF. The tanker truck shall be located either in a transfer bay or in an adjacent enclosure.

The current water treatment system shall remain operational during all underwater operations disturbing the sludge or SNF source term.

Additional equipment shall be placed on line as necessary to maintain water quality

**4) The Annual Possession Quantity is limited to the following radionuclides (Curies/year):**

Am - 241	2.03E+05	Am - 242 m	1.14E+02	Am - 242	1.14E+02
Am - 243	7.12E+01	Ba - 137 m	6.26E+06	C - 14	3.62E+02
Cd - 113 m	1.84E+03	Ce - 144	1.09E+03	Cm - 242	9.42E+01
Cm - 244	8.84E+02	Co - 60	1.96E+03	Cs - 134	7.99E+03
Cs - 135	3.96E+01	Cs - 137	6.61E+06	Eu - 152	4.77E+02
Eu - 154	5.48E+04	Eu - 155	1.19E+04	Fe - 55	1.08E+03
H - 3	1.84E+04	I - 129	3.26E+00	Kr - 85	2.92E+05
Nb - 93 m	1.24E+02	Ni - 59	2.11E+01	Ni - 63	2.31E+03
Np - 237	3.02E+01	Pd - 107	8.59E+00	Pm - 147	2.73E+05
Pr - 144	1.08E+03	Pr - 144 m	1.31E+01	Pu - 238	6.07E+04
Pu - 239	1.15E+05	Pu - 240	6.38E+04	Pu - 241	2.60E+06
Pu - 242	3.07E+01	Rh - 106	1.84E+03	Ru - 106	1.84E+03
Sb - 125	1.88E+04	Sb - 126	1.13E+01	Sb - 126 m	8.07E+01
Se - 79	4.35E+01	Sm - 151	8.95E+04	Sn - 119 m	3.82E-01
Sn - 121 m	4.03E+01	Sn - 126	8.07E+01	Sr - 90	5.01E+06

Tc - 99	1.45E+03	Te - 125 m	4.57E+03	U - 234	4.66E+02
U - 235	1.77E+01	U - 236	6.61E+01	U - 238	3.80E+02
Y - 90	5.01E+06	Zr - 93	2.01E+02		

- 5) **This condition was obsoleted on 03/07/2001.** Water sampling must be done once per shift during fuel retrieval, debris removal, or sludge disturbance underwater

*Added by NOC revision approved via AIR 97-206. Obsoleted by NOC Application/Permit Revision form approved March 7, 2001 via AIR 01-504*

- 6) **This condition was obsoleted on 04/26/2001.** This activity involves the retrieval and transport of fuel to the KW Basin. It includes the installation of new equipment, fuel removal and sludge relocation activities expected to be routine in the future

*Added by NOC revision approved via AIR 97-206. Obsoleted by process description*

- 7) The required controls for all underwater work includes the basin water and existing water treatment system. All operations shall cease and the department notified if Cs-137 water concentrations reach 30 microcuries per liter. If concentrations reach 15 microcuries per liter, incremental filtration equipment not yet in service shall be added to maintain water quality below the action level

- 8) All work above water with a potential for airborne contamination must be performed in containment, (e.g., glovebags, green houses, other containment devices)

- 9) **This condition was obsoleted on 04/26/2001.** An additional three continuous air monitors are required during all above water work. These monitors shall be set to a low level of detection as an early alert of potential airborne contamination problems

*Added by NOC revision approved via AIR 97-206. Obsoleted by new condition added to reflect agreement reached during meeting held March 26, 2001 via 01-504*

- 10) During SNF and debris retrieval and removal activities, a minimum of one of the ion exchange systems and the particulate filtration system must be in operation, as described in the NOC. In addition, any activity that re-suspends the sediment will also require one of these systems to operate

- 11) **This condition was obsoleted on 10/04/2001.** Prior to beginning actual encapsulation of fuel or sediment or cleaning and crushing canisters, DOH will establish two water radionuclides concentration action levels, with input from Westinghouse health physicists.

a. When the lower level is reached or exceeded, the ion exchange column and ion exchange module will both be placed in operation, OR all underwater encapsulation activities will cease until the radionuclide concentration level falls below the action level.

b. When the higher action level is reached or exceeded, it will be mandatory for all underwater activities to cease until both ion exchange systems lower the radionuclide concentration to below the lower level

*Original condition per AIR 93-908. Obsoleted by KE Basin Fuel Removal NOC approved 10/6/2000*

- 12) **This condition was obsoleted on 03/06/2001.** A minimum of one water sample per shift (during underwater encapsulation activities) is required to determine radionuclide concentration levels. The details of this sampling requirement (location of samples, grab verses composite, multiple verses single, turn around time, radionuclides analyzed, etc.) will be determined by DOH prior to the start of any underwater encapsulation activities. Preparatory work (pre-encapsulation activities) may, however, commence immediately

*Original condition per AIR 93-908. Obsoleted by RTAM revision form submitted March 7, 2001 via AIR 01-504*

- 13) **This condition was obsoleted on 10/04/2001.** Only those activities described in the NOC are

approved, with two additions; leak detection activities may proceed, plus installation of the suction header and associated equipment described in the draft Engineering Change Notice No. 160489. Leak detection work causing significant sludge resuspension will be subject to water concentration action levels set by DOH

*Original condition per AIR 93-908. Field work complete*

- 14) **This condition was obsoleted on 10/04/2001.** Empty canisters will not be removed from the basin concurrent with encapsulation activities involving fuel or sediment

*Original condition per AIR 93-908. Obsoleted by KE Basin Fuel Removal NOC Approved 10/6/200*

- 15) Canisters (or other equipment) can be removed from the water only when the radionuclide concentration in the water is below the lower action level
- 16) Above water work involving any radionuclide source term must be collocated adjacent to alpha and beta Continuous Air Monitors (CAM). DOH will establish alarm set points, with input from Westinghouse health physicists
- 17) **This condition was obsoleted on 10/04/2001.** A "greenhouse" must be erected adjacent to any above water work involving radionuclides. Contaminated material must be immediately bagged in plastic, moved into the greenhouse or returned to the water. This greenhouse must be actively ventilated through HEPA filtration when any loose or smearable contamination is present inside. If CAMs alarm at the established set points, any contaminated material must be immediately placed in the greenhouse or returned to the water

*Original condition per AIR 93-908. NOC 3-7-00 obsoletes this condition*

- 18) **This condition was obsoleted on 10/04/2001.** DOH will establish airborne radionuclide emission limits for all encapsulation activities, with input from Westinghouse health physicists, prior to commencement of encapsulation of fuel or sludge. The point of compliance will be fixed head samplers at the building exhaust points

*Original condition per AIR 93-908. Obsoleted by KE Basin Fuel Removal NOC approved 10/6/200*

- 19) **This condition was obsoleted on 10/04/2001.** The sludge encapsulation procedure must be provided to DOH before encapsulation commences. Pre-encapsulation activities may proceed

*Original condition per AIR 93-908. Obsoleted by Fuel Removal NOC approved 10/6/200*

- 20) Power must be provided for an ambient air sampler for DOH at a location designated by the department's Environmental Radiation Section
- 21) The DOH reserves the right to inspect the facility at any time
- 22) The DOH approval is contingent on the U.S. DOE receiving approval from the Environmental Protection Agency for the radionuclides NESHAPs

- 23) **This condition was obsoleted on 10/04/2001.** DOH must be notified of encapsulation start-up. We also request periodic updates of preparatory work

*Original condition per AIR 93-908. Obsoleted by KE Basin fuel Removal NOC Approved 10/6/200*

- 24) **This condition was obsoleted on 04/26/2001.** The Higher Action Level shall be 3.0 E-2 microcuries/ml

*Original condition per AIR 93-908. Obsoleted by NOC Application/Permit Revision form approved March 7, 2001. Letter # Air 01-504*

- 25) **This condition was obsoleted on 04/06/2001.** The Lower Action Level shall be 1.5E-02 microCurie/ml

*Original condition per AIR 93-908. Obsoleted by NOC Application/Permit Revision form approved March 7, 2001. Letter # Air 01-504*

- 26) Transmit the procedures used to collect water samples, and to analyze the water samples taken once per shift
- 27) **This condition was obsoleted on 10/11/2001.** Describe the possibility of piping around the ion exchange columns to operate the associated cartridge filters separated from the ion exchange columns  
*Condition added by AIR 93-923. Item closed*
- 28) Provide a central location for the following information updated at least monthly:
- a. The constant air monitor sample analyses.
  - b. The in-house water sample analyses.
  - c. The routine contamination surveys.
  - d. The results of Kr-85 and Tritium monitoring
- 29) **This condition was obsoleted on 04/26/2001.** Transmit semi-annually, the weekly (raw data) water and air sample laboratory results  
*Condition added by AIR 93-923. Obsoleted by prior agreement with the department*
- 30) **This condition was obsoleted on 04/26/2001.** Provide quarterly confirmation measurements for Pu-241  
*Condition added by AIR 93-923. Obsoleted by prior agreement with the department*
- 31) **This condition was obsoleted on 10/04/2001.** The department will have access to inspect the encapsulation activities 24 hours/day  
*Condition added by AIR 93-923. Obsoleted by Fuel removal NOC approved 10/06/200*
- 32) **This condition was obsoleted on 10/11/2001.** Provide documentation that describes criticality concerns in KE-Basin water filtration equipment  
*Condition added by AIR 93-923. Documentation provided. Closed after inspection of July 17, 1997*
- 33) **This condition was obsoleted on 10/04/2001.** The ALARA concept proposed in the NOC is not definitive enough for the department to approve. Therefore, all work above water with a potential for airborne contamination must be performed in containment. Authorized work above water involving contaminated equipment or materials is limited to:
- a. Maintenance activities performed on fuel removal equipment.
  - b. Routine activity contamination control practices.
  - c. All items removed and let out of the water.
  - d. Maintenance on components that directly contact the fuel such as end effectors on manipulators.

Clarification:

(1a) The above applies to any above water activity addressed in the NOC, with the potential for airborne contamination, and if not performed in containment shall require that activities be co-located with alarming continuous air monitors (CAMs), which shall be operated according to procedures agreed upon between WDOH and DOE/RL. WDOH confirmed that bagging immediately, putting in a greenhouse, or returning to water are still acceptable practices for debris removal from the basin.

(1b) Contaminated material (including removed debris) shall be immediately bagged in plastic, moved into a greenhouse or returned to the water. The required greenhouses shall be actively ventilated through HEPA filtration when any loose or smearable contamination is present inside.

(1c) See the approved 9/12/1995 "Routine Activities" controls which are acceptable for this work

*Added by Telecon March 19, 1997 as an amendment to AIR 97-206. Obsoleted by NOC Revision and Phone conversation with DOE 10/04/2001*

- 34) Authorized work above water involving contaminated equipment or materials are limited to: Maintenance activities performed on fuel removal equipment; routine activity contamination control practices; all items removed and left out of water; and maintenance components that directly contact the fuel such as end effectors on manipulators
- 35) **This condition was obsoleted on 10/04/2001.** All items shall be promptly bagged after cutting for transport and disposal  
*Added by Telecon March 19, 1997 as an amendment to AIR 97-206. Obsoleted by KE Basin Fuel removal NOC and telephone conversation with DOE on 10/04/2001*
- 36) NOTE: Some of the A.R.s were satisfied by letter DOE/RL, 97-EAP-349, dated 4/2/97
- 37) Water action levels of 15 uCi/liter shall require incremental water filtration equipment not yet in service (e.g., hydrocyclones, back flushable mechanical filters, sandfilter, cartridge filter)
- 38) **This condition was obsoleted on 04/26/2001.** Some items removed from the south loadout pit may extend a few feet into the water and shall be rinsed and promptly bagged into plastic  
*Added by Telecon March 19, 1997 as an amendment to AIR 97-206. Obsoleted by new condition added to reflect agreement reached during meeting held March 26, 2001 via AIR 01-504*
- 39) If basin water quality is equal to or less than 10 uCi/liter Cs-137, water sampling shall be done once per day with the results available the next working day
- 40) If basin water quality is greater than 10 uCi/liter Cs-137, water sampling shall be done once per shift with the result available by the end of the next following shift
- 41) **This condition was obsoleted on 10/11/2001.** Additional continuous air monitors are required during all above water work. These monitors shall be set to a low level of detection as an early alert of an potential airborne contamination problems. These shall be operational prior to removing fuel from the basin. Number of monitors and placement shall be approved by the department  
*Condition added to reflect agreement reached during meeting held March 26, 2001 via AIR 01-504*
- 42) **This condition was obsoleted on 10/04/2001.** Items removed from the basin water shall be rinsed and promptly bagged into plastic  
*Condition added to reflect agreement reached during meeting held March 26, 2001 via AIR 01-504. Condition obsoleted by Fuel Removal NOC revision 1 and Telephone conversation with DOE on 10/4/2001*
- 43) **This condition was obsoleted on 10/11/2001.** Obsolete conditio

DEPARTMENT OF HEALTH  
RADIOACTIVE AIR EMISSIONS  
NOTICE OF CONSTRUCTION  
APPROVAL FOR  
PROJECT TITLE: 105-KW BASIN FUEL REMOVAL

Date Approved: 06-Oct-01

Emission Unit Name: 105-KW VENTS

Emission Unit ID 224

This is a MINOR, ACTIVELY ventilated emission unit.

**This emission unit requires the following Abatement Technology:**

Applicable Requirements: ALARACT

ALARACT [WAC 246-247-040(4)]  
BARCT [WAC 246-247-040(3)]

Zone or Area:	Abatement Technology	Required # of Units	Additional Description/Conditions
	Sandfilter	1	
	Cartridge filter	2	2 in parallel
	Skimmer pump	1	
	Recirc pump	2	2 in parallel
	Water Basin	1	
	Ion exchange	4	4 in parallel
	Filter vessel, sand garnite	3	3 in parallel
	Chiller	1	
	Polishing filter	1	optional
	Settler	1	multiple tanks

Additional abatement technologies required by this Notice of Construction will be listed in the Conditions and Limitations section.**This emission unit has the following Monitoring and Sampling Requirements:**

Applicable Requirements: Monitoring, Testing and Quality Assurance WAC 246-247-075

Federal and State Regulatory	Monitoring and Testing Procedure	Radionuclides Requiring Measurement	Sampling Frequency
40 CFR 61.93(b)(4)(i) & WAC 246-247-075[3]	Appendix B, Method 114(3)	All radionuclides which could contribute 10% of the potential EDE.	Monthly Sample

**Sampling Requirements:** Record SampleAdditional monitoring or sampling requirements established by this NOC will be listed in the Conditions and Limitations section.**Change History**

07/28/1997 NOC (DOE/RL-97-28 Rev 0) approved via AIR 97-706 on July 28, 1997. This approval required that the conditions and limitations of AIR 97-206 be applied to this NOC.

01/29/1998 NOC revision approved via AIR 98-105 on January 29, 1998.

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09/21/1999 NOC revision approved September 21, 1999.

01/03/2000 NOC Revision Form approved January 4, 2000. Revision of process description.

01/04/2000 Clarification of conditions approved via RTAM January 4, 2000.

10/10/2000 NOC Revision Form approved October 10, 2000. This revision clarified/changed conditions.

03/07/2001 NOC Application/Permit Revision Form approved March 7, 2001. This revision clarified/changed conditions.

04/30/2001 Two NOC Application/Permit Revision Forms approved April 3, 2001 (DOE/RL-97-28, Rev OA). These are process changes for two additional process tables and to allow pumping of water from CVD to either the basin by direct pumping or to the Integrated Water Treatment System (IWTS) downstream of the settling chamber.

05/15/2001 NOC Revision Form approved May 15, 2001. Revision of contamination limits on the MCO shipping cask. Approval letter, AIR 01-603 mailed June 22, 2001.

07/27/2001 NOC Revision (DOE/RL-97-28, Rev 1) received July 27, 2001.

10/11/2001 NOC Revision (DOE/RL-97-28, Rev2) received 10/04/2001, all concerns from Rev1 incorporated.

06/04/2002 NOC Revision 3, DOE/RL-97-28 approved in RTAM May 7, 2002. This is a CERCLA Facility. No approval letter needs to be generated. No additional conditions and limitations need to be added. This concurs with EPA on changes to the Fuel transfer Annex Design.

10/04/2002 9/4/2002 NOC REV Number DOE/RL-97-28 2C approved in RTAM. No additional conditions added.

## CONDITIONS AND LIMITATIONS

- 1) The U.S. Department of Energy shall comply with all Conditions and Limitations of this license (WAC 246-247-060(5)).
- 2) The total abated emission limit for this Notice of Construction is limited to  $4.64\text{E-}04$  mrem/year to the Maximally Exposed Individual (WAC 246-247-040(5)). The total limit on the Potential-To-Emit for this Notice of Construction is limited to  $3.71\text{E-}03$  mrem/year to the Maximally Exposed Individual (WAC 246-247-030(21)).
- 3) **This process is limited to:**  
activities necessary to remove spent nuclear fuel from the 105 KW Basin including the fuel transported to KW Basin from KE Basin, and transport the fuel to the Cold Vacuum Drying Facility (CVDF). Removal and transport of the fuel is limited to the four following program elements: supporting construction activities necessary to provide the specialized equipment to do the work, processing underwater fuel and treating associated water by the Integrated Water Treatment System (IWTS), removing the fuel from the water and transporting the fuel to the CVDF, and handling of fuel retrieval byproducts including debris and sludge.

The fuel retrieval process is limited to being conducted underwater. The process shall encompass cleaning and repackaging the fuel in multi-canister overpack (MCO) baskets. The process shall ensure that as much of the loose oxides as possible are removed from the fuel before transport. Underwater operations shall involve the use of manipulators to handle the fuel, although some (above water) hoists will be used to handle MCO baskets and canisters. The use of long-handled tongs or similar tools will supplement the manipulators as necessary. The radionuclides dispersed within the water during this process shall be collected and treated by the Integrated Water Treatment System (IWTS). It is not allowed to conduct the fuel retrieval process without the IWTS operating, as necessary, to remove sludge from the work areas.

Remove the fuel, once packaged in MCO baskets and loaded into the MCO, from the basin by way of a container (MCO and integral cask) to minimize contamination on the cask as the cask leaves the water. Expose only the top surface of the MCO to the basin water and readily decontaminated. Close the MCO underwater and seal within the cask before loading for transport to the Cold Vacuum Drying Facility (CVDF).

Construction activities are limited to the installation of uncontaminated (new) equipment in the basin, portions placed underwater on the floor of the basin and portions installed above water.

During the installation of fuel retrieval system (FRS), Integrated Water Treatment System, or MCO/cask loadout equipment, it is allowed to remove, reconfigure, reinstall, and test such equipment. Follow as low as reasonably achievable (ALARA) methods to control contamination.

Equipment processes shall include the FRS, MCOs, MCO loading, MCO casks, MCO/cask handling, MCO/cask transportation, Integrated Water Treatment System (IWTS), and sludge, debris handling and fuel transfer system (FTS). Modifications to the existing basin are allowed to accommodate these systems. Existing systems shall provide support functions.

The FRS shall be used to retrieve fuel stored in canisters throughout the basin and to prepare the fuel for removal from the basin in a configuration suitable for downstream conditioning processes.

The FRS shall include the monorail hoists and transfer crane, primary clean machine, process table, manipulators, cameras and lighting, MCO basket queue, equipment operations center, and stuck fuel equipment.

The FRS operation shall retrieve the fuel from storage locations in the basin, clean the fuel, load the fuel into MCO baskets, and queue the baskets for MCO loading. Sludge generated during the cleaning process shall be collected into the Integrated Water Treatment System (ITWS) and pumped to the sludge accumulation area(s) via the IWTS interface with the primary clean machine and the stuck fuel equipment (if needed). Debris material collected during the fuel cleaning process shall be stored in the basin for later removal. All FRS operations shall occur underwater.

Maintenance of the FRS is limited to routine removal of the manipulators from the basin for rebuilding, and repair and replacement of hoist/grapple type couplings and underwater cameras. The balance of the FRS equipment is primarily passive and therefore requires minimal maintenance and repair.

The MCO fuel baskets shall be put into the MCO/cask while underwater. The transfer bay crane shall be used to hoist the MCO and transport cask together into and out of the south loadout pit. The MCO cask assembly shall have a minimal exposure to the basin water and the exterior of the cask shall be free (at radiological survey detection limits or less than DOT contamination limits, i.e. 49 CFR 173.443) of all removable contamination when the cask is removed from the basin. The MCO shall be placed in the cask, the cask shall then be sealed and transported to the CVDF full of basin water.

The Integrated Water Treatment System (ITWS) shall maintain basin water quality during fuel retrieval and removal activities.

The Integrated Water Treatment System (ITWS) shall treat the basin water by filtering, settling, cooling,



and providing ion exchange capabilities. Intakes shall be configured, as necessary, to provide suction from operations dispersing sludge into the water, such as fuel cleaning, sludge pumping, decapping, and debris removal. Any excess water from the Integrated Water Treatment System shall be returned to maintain circulation throughout the basin.

Water in the basin shall be managed as a closed-loop system, with the water continually being removed from the basin, the majority of which will be circulated through the treatment system and returned to the basin. The Integrated Water Treatment System (IWTS) shall maintain water quality and temperature in the basin, while providing the necessary collection of cloudy water, treatment of water, and return of treated water to fuel removal processes as necessary.

An anion/cation deionization system shall be used to add makeup water to the basin and for cleaning of equipment. Other uses for this water will be connections for MCO/cask loadout flushing and general future use connection points.

In the transfer bay area, excess treated basin water shall be removed through the Integrated Water Treatment System (IWTS) piping. Water shall be removed via a connection located in the transfer bay. This water shall be pumped to a tanker truck and transported to the 200 Area Effluent Treatment Facility (200 Area ETF). The tanker truck shall be equivalent to the truck currently being used to transport water from the 100 N Emergency Dump Basin to the 200 Area ETF. The tanker truck shall be located either in a transfer bay or in an adjacent enclosure.

The Integrated Water Treatment System (IWTS) shall use manual, remote, and automated techniques for operations control. The current water treatment system shall remain operational during the installation of new and relocated equipment for the IWTS. It is allowed to have the current water treatment system offline when connections are made from the current water treatment system. This shall be minimal and the water quality shall be monitored during this time. The IWTS shall have the capability to control water quality in the basin. This shall be accomplished by bringing those systems on line, as needed, to achieve the desired water quality. Additional equipment shall be placed on line as necessary to maintain water quality.

During processing at the CVDF, most of the water and some of the particulates shall be removed from MCO's. It is allowed to return the water removed to 105 KW Basin. If the excess water is returned, the water shall be treated first by ion exchange and filtration to reduce the radionuclides.

The liquid at CVDF shall be transferred to 105 KW Basin by tank trucks. A temporary building shall be provided outside the transfer bay to house the truck unloading/loading facility. The truck unloading shall include provision for a spill containment pan for the tanker, piping, pump, and instrumentation. For unloading, the tanker truck shall be connected to the pump using flexible hose and quick disconnect fittings. Any leakage from the fittings shall be cleaned up promptly so that the work area is maintained with no smearable radioactive contamination. The water shall enter the basin by direct pumping into the basin or the IWTS down stream of the settling chamber

**4) The Annual Possession Quantity is limited to the following radionuclides (Curies/year):**

Am - 241	1.67E+05	Am - 242 m	8.16E+01	Am - 242 m	8.20E+01
Am - 243	4.89E+01	Ba - 137 m	6.34E+06	C - 14	3.31E+02
Cd - 113 m	1.78E+03	Ce - 144	2.28E+02	Cm - 242	6.67E+01
Cm - 244	5.81E+02	Co - 60	2.22E+03	Cs - 134	1.03E+04
Cs - 135	3.79E+01	Cs - 137	6.71E+06	Eu - 152	4.87E+02

Eu - 154	5.62E+04	Eu - 155	1.15E+04	Fe - 55	9.77E+02
H - 3	1.91E+04	I - 129	3.11E+00	Kr - 85	3.15E+05
Nb - 93 m	1.20E+02	Ni - 59	1.99E+01	Ni - 63	2.19E+03
Np - 237	2.70E+01	Pd - 107	7.68E+00	Pm - 147	2.42E+05
Pr - 144	2.26E+02	Pr - 144	2.74E+00	Pu - 238	5.12E+04
Pu - 239	9.93E+04	Pu - 240	5.52E+04	Pu - 241	3.02E+06
Pu - 242	2.42E+01	Rh - 106	5.76E+02	Ru - 106	5.76E+02
Sb - 125	1.85E+04	Sb - 126	1.05E+01	Sb - 126	7.50E+01
Se - 79	4.28E+01	Sm - 151	8.69E+04	Sn - 121 m	3.98E+01
Sn - 126	7.50E+01	Sr - 90	5.22E+06	Tc - 99	1.43E+03
Te - 125 m	4.50E+03	U - 234	4.08E+02	U - 235	1.60E+01
U - 236	6.11E+01	U - 238	3.16E+02	Y - 90	5.22E+06
Zr - 93	2.01E+02				

- 5) Only those activities described in the NOC are approved. Any modifications to the process described must be approved by the department
- 6) Any removal of equipment after placement in the basin for this activity must follow as low as reasonable achievable (ALARA) principles. A procedure for what will constitute the ALARA principles must be provided to the department before construction activities are completed and before removal actions commence. The work associated with those ALARA principles shall not cause any potential-to-emit to the air in excess of what is approved in this NOC
- 7) The cask containing the multi-canister overpack (MCO) must be decontaminated on its exterior surfaces prior to removal from the basin. The MCO must be closed underwater and sealed within the cask prior to transport to the Cold Vacuum Drying Facility (CVDF)
- 8) All conditions placed on the operation of this facility in prior correspondence, including AIR 97-206, March 5, 1997, still applies, unless specifically superseded by this NOC
- 9) **This condition was obsoleted on 03/07/2001.** The required controls for all underwater work includes the basin water and the Integrated Waster Treatment System ( IWTS) as described in Section 6.1.3. Limitations on water concentrations will be based on Cs-137 levels. All operations must cease, if water Cs-137 concentrations reach 30 microcuries per liter. If concentrations reach 15 microcuries per liter, at least two ion exchange modules must operate, in addition to other controls to maintain water quality below the action level. Sampling must be done once a shift, when work is occurin  
*Original condition approved via AIR 97-706 on July 28, 1997. Obsoleted via NOC Application/Permit Revision Form approved March 7, 2001*
- 10) Water may be added or removed under those conditions described
- 11) Sludge sampling, as described is approved, providing the sample is not exposed to the air
- 12) Debris removal is approved
- 13) All conditions and limitations must be proceduralized prior to commencing construction or operations, as applicable. Those procedures made available to DOH inspectors. Audits and inspections of the project will occur
- 14) This approval to construct is valid for two years from the date of the letter. If construction does not commence within that two year window, approval is void
- 15) Sludge transfer from a sludge accumulation area is not approved
- 16) All work above water, with a potential-to-emit airborne radioactivity must be performed in

containment, as described in AIR 97-206 for 105 KE Fuel Removal. Authorized work above water on contaminated equipment is limited to maintenance activities on fuel removal equipment, routine contamination control practices, decontamination or packaging of items to be left out of water, and maintenance on components that directly contact the fuel, such as end effectors or manipulators

- 17) Monitoring shall consist of three fixed head samplers, as currently configured, and shall include nearfield samplers N-476, 477, 478, and 479
- 18) Modifications described are approved
- 19) The above water source term is limited to that described
- 20) In the event of Integrated Water Treatment System (IWTS) failure, all activities must cease, except for safe shutdown required for worker safety
- 21) Emissions must not exceed those listed on a calendar year basis
- 22) The Integrated Water Treatment System (IWTS) must operate whenever the fuel retrieval process is occurring. The IWTS must be configured as described
- 23) The removal equipment, is approved only as described. Any modifications involving different equipment not listed in the section, must be presented to DOH prior to installation for approval
- 24) **This condition was obsoleted on 03/07/2001.** Water sampling must be done once per shift during fuel retrieval, debris removal, or sludge disturbance underwater  
*Added by NOC revision approved via AIR 98-105 on January 29, 1998. Obsoleted via NOC Application/Permit Revision Form approved March 7, 2001*
- 25) This approval is valid for two years from the date of this letter. If construction does not commence within that two year window, approval is void
- 26) All removal efficiencies for water treatment system must be as described, and must be verifiable upon request
- 27) Any modifications not described in this NOC are not approved
- 28) All work above water or below water which will cause the PTE to be greater than which is in this NOC is not approved
- 29) Sludge movement and transfer within the 105 KW Basin is approved as described in this NOC
- 30) **This condition was obsoleted on 01/04/2000.** Weekly air filters from inside the basin must be composited and analyzed monthly for gamma emitting radionuclides, Sr-90, Am-241, and plutonium isotopes  
*Added by NOC revision approved via AIR 98-105 on January 29, 1998. Obsoleted by approval to perform quarterly sample analysis via January 4, 2000 RTAM. Individual monthly composite analysis will be performed on a quarterly basis*
- 31) All equipment as described for removal and installation is approved. Any equipment not described must have DOH approval prior to installation
- 32) All above and below water work as described is approved. All ALARA principles and Hanford guide lines must be followed to ensure low emissions
- 33) All conditions placed on the operation of this facility in prior correspondence, including AIR 97-206, March 5, 1997 (i.e. locations of CAMs in 105 KW Basin), and AIR 97-706, July 28, 1997 (i.e. clarification of conditions from the October 6, 1997 meeting) still apply, unless specifically superseded by this NOC
- 34) The required controls for all underwater work includes the basin water and the Integrated Water

- Treatment System (IWTS). All operations shall cease and the department notified if Cs-137 water concentrations reach 30 microcuries per liter. If concentrations reach 15 microcuries per liter, at least two ion exchange modules shall operate, in addition to other controls to maintain water quality below the action level
- 35) Only those activities described in the NOC as modified, are approved. Any additional modifications to the process described must be approved by the department
  - 36) All work above water, with a potential-to-emit airborne radioactivity must be performed in containment or with ALARA principles as described in this NOC
  - 37) Up to 0.1 metric tons uranium (MTU) of fuel may be transferred from N-Basin to 105 KW Basin
  - 38) **This condition was obsoleted on 06/13/2001.** The revised above water source term as described in this NOC is limited to that described  
*Added by NOC revision approved via AIR 98-105 on January 29, 1998*
  - 39) It is understood that air sparging to take place in the sand and garnet filter vessels will turn this vessel into a major emission point. This will require a separate Notice of Construction which must demonstrate isolation of the air pathway from this portion of the Integrated Water Treatment System (IWTS) from the rest of the IWTS and K West Basi
  - 40) **This condition was obsoleted on 10/06/2000.** The Integrated Water Treatment System ( IWTS) must operate whenever the fuel retrieval process is occurring. If the IWTS fails, work in progress below water may be completed prior to termination of all work for safety concerns as described in this NOC  
*Added by NOC revision approved via AIR 98-105 on January 29, 1998. Obsoleted by NOC revision form approved October 6, 2000*
  - 41) All conditions and limitations must be proceduralized prior to commencing construction or operation, as applicable. These procedures must be made available for DOH inspectors. Audits and inspection of this project will occur
  - 42) If basin water quality is equal to or less than 10 uCi/liter Cs-137, water sampling shall be done once per day with the results available the next working day
  - 43) If basin water quality is greater than 10 uCi/liter Cs-137, water sampling shall be done once per shift with the result available by the end of the next following shift
  - 44) Weekly air filters from inside the Basin must be composited monthly for analysis. The monthly analysis may be performed on a quarterly basis. Analysis shall include gamma emitting radionuclides, Sr-90, Am-241, and plutonium isotopes